

IN THE CLAIMS:

Please cancel claims 1-5, 11-13, and 15-16, without prejudice or disclaimer.

Please amend claims 6-10 and 14, and add new claims 17-24 as follows:

Claims 1-5 (canceled).

6. (currently amended) [[-]] The burner as claimed in claim [[5]] 17, wherein the at least one plurality of peripheral orifices of the cylindrical member are formed in a perpendicular form with respect to the cylindrical member.

7. (currently amended) [[-]] The burner as claimed in claim [[5]] 17, wherein the at least one plurality of peripheral orifices of the cylindrical member are formed tangentially with an angle in the range from 0 to 15 degrees, to produce a swirl effect of the first flow of air or gas around the pulverized fuel-air mixture.

8. (currently amended) [[-]] The burner as claimed in claim [[1]] 17, wherein the exit passages discharge ends of said flow distribution means are separated with an angle from about 10° to about 20° between each other.

9. (currently amended) [[-]] The burner as claimed in claim [[1]] 17, wherein the main body includes a conical section, said conical section being uniformly reduced ~~from~~ from a major diameter to a minor diameter in the body of said burner, said minor diameter being connected with the flow distribution means for increasing the velocity of the first flow of air or gas and said pulverized fuel-air mixture.

10. (currently amended) [[-]] The burner as claimed in claim [[1]] 17, wherein the main body includes an enlarged conical section, said enlarged conical section being uniformly reduced ~~form~~ from a major diameter to a minor diameter in the body of said burner, said minor diameter being connected with the flow distribution means for increasing the velocity of the first flow of air or gas and said pulverized fuel-air mixture.

Claims 11-13 (canceled).

14. (currently amended) [[-]] The burner as claimed in claim [[1]] 17, wherein the ~~second~~ at least one plurality of peripheral orifices are disposed in coincidence with the second connecting chamber ~~are~~ to be formed in an angular position to provide a swirl effect to the first flow of air or gas and to said pulverized fuel-air mixture.

Claims 15-16 (canceled).

17. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

an outer pipe;

an intermediate pipe; and

an inner pipe;

said pipes being concentrically arranged one with the other, said outer pipe and said intermediate pipe forming a first pipe chamber;

said outer pipe including an inlet pipe and an outlet pipe for introducing and for circulating a cooling fluid within said first pipe chamber for the cooling of the burner;

said intermediate pipe including a first inlet for introducing a first flow of air or gas in a second pipe chamber, said second pipe chamber being defined between said inner pipe and said intermediate pipe;

said inner pipe including a second inlet for introducing a flow of a pulverized fuel-air mixture through said inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of said main body, said flow distribution means having a curvature to uniformly change the flow trajectory of said pulverized fuel-air mixture and said flow of air or gas, said distribution means including:

an outer cylindrical body;

an intermediate cylindrical body;

an inner cylindrical body, with said outer cylindrical body and said intermediate cylindrical body defining a first connecting chamber for circulating the cooling fluid of said main body for the cooling of the flow distribution means, said inner cylindrical body and said intermediate cylindrical body defining a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of said second pipe chamber of said main body; and

a main fluid chamber for receiving and for conveying the mixture of pulverized fuel-air out to at least an exit end of said flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each discharge end, said discharge nozzle including:

a head;

a cylindrical member coupled in the rear part of said head, said cylindrical member having:

a central orifice; and

at least one plurality of peripheral orifices formed in the periphery of said cylindrical member, said at least one plurality of peripheral orifices being formed transversely around the periphery of the cylindrical member to provide communication between the second connecting chamber and the central orifice of said discharge nozzle.

18. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

an outer pipe;

an intermediate pipe; and

an inner pipe;

wherein the pipes are concentrically arranged one with the other;

wherein the outer pipe and the intermediate pipe form a first pipe chamber;

wherein the outer pipe includes:

an inlet pipe; and

an outlet pipe for introducing and for circulating a cooling fluid within the first pipe chamber for the cooling of the burner;

wherein the intermediate pipe includes:

a first inlet for introducing a first flow of air or gas in a second pipe chamber, the second pipe chamber being defined between the inner pipe and the intermediate pipe; and

wherein the inner pipe includes a second inlet for introducing a flow of a pulverized fuel-air mixture through the inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of the main body, the flow distribution means having a curvature to uniformly change the flow trajectory of the pulverized fuel-air mixture and the flow of air or gas, the distribution means including:

an outer cylindrical body;

an intermediate cylindrical body;

an inner cylindrical body; and

a main chamber;

wherein the outer cylindrical body and the intermediate cylindrical body define a first connecting chamber for circulating the cooling fluid of the main body for the cooling of the flow distribution means;

wherein the inner cylindrical body and the intermediate cylindrical body define a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of the second pipe chamber of the main body; and

wherein the main fluid chamber receives and conveys the mixture of pulverized fuel-air out to at least an exit end of the flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each one of the exit ends of the flow distribution means, the discharge nozzle including:

a head; and

a cylindrical member coupled in the rear part of the head, the cylindrical member having:

a central orifice in a frusto-conical form, with a diameter less in a front portion thereof than in a rear portion thereof, with the central orifice in coincidence with the main fluid chamber for permitting the exit of the pulverized fuel-air mixture;

a plurality of peripheral orifices disposed in coincidence with the second connecting chamber to permit the first flow of air or gas and the pulverized fuel-air mixture to be simultaneously mixed at the exit end of the flow distribution means for producing a flame in the combustion zone of the glass melting furnace, wherein the plurality of peripheral orifices are formed in the periphery of the cylindrical member, with the plurality of peripheral orifices being formed transversally around the periphery of the cylindrical member to provide communication between the second connecting chamber and the central orifice of the discharge nozzle.

19. (new) The burner as claimed in claim 18, wherein the plurality of peripheral orifices of the cylindrical member are formed in a perpendicular form with respect to the cylindrical member.

20. (new) The burner as claimed in claim 18, wherein the plurality of peripheral orifices of the cylindrical member are formed tangentially with an angle from 0° to 15°, to produce a swirl effect of the first flow of air or gas around the pulverized fuel-air mixture.

21. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

- an outer pipe;
- an intermediate pipe; and
- an inner pipe;

wherein the pipes are concentrically arranged one with the other;

wherein the outer pipe and the intermediate pipe form a first pipe chamber;

wherein the outer pipe includes:

an inlet pipe; and

an outlet pipe for introducing and for circulating a cooling fluid within the first pipe chamber for the cooling of the burner;

wherein the intermediate pipe includes:

a first inlet for introducing a first flow of air or gas in a second pipe chamber, the second pipe chamber being defined between the inner pipe and the intermediate pipe; and

wherein the inner pipe includes a second inlet for introducing a flow of a pulverized fuel-air mixture through the inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of the main body, the flow distribution means having a curvature to uniformly change the flow trajectory of the pulverized fuel-air mixture and the flow of air or gas, the distribution means including:

an outer cylindrical body;

an intermediate cylindrical body;

an inner cylindrical body; and

a main chamber;

wherein the outer cylindrical body and the intermediate cylindrical body define a first connecting chamber for circulating the cooling fluid of the main body for the cooling of the flow distribution means;

wherein the inner cylindrical body and the intermediate cylindrical body define a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of the second pipe chamber of the main body; and

wherein the main fluid chamber receives and conveys the mixture of pulverized fuel-air out to at least an exit end of the flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each one of the exit ends of the flow distribution means, the discharge nozzle including:

a central orifice in coincidence with the main fluid chamber for permitting the exit of the pulverized fuel-air mixture; and

a first plurality of orifices disposed in coincidence with the second connecting chamber to permit the first flow of air or gas and the pulverized fuel-air mixture to be simultaneously mixed at the exit end of the flow distribution means for producing a flame in the combustion zone of the glass melting furnace;

wherein a pair of discharge ends of the flow distribution means are separated with an angle ranging from about 10° to about 20° between each other.

22. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

an outer pipe;

an intermediate pipe; and

an inner pipe;

wherein the pipes are concentrically arranged one with the other;

wherein the outer pipe and the intermediate pipe form a first pipe chamber;

wherein the outer pipe includes:

an inlet pipe; and

an outlet pipe for introducing and for circulating a cooling fluid within the first pipe chamber for the cooling of the burner;

wherein the intermediate pipe includes:

a first inlet for introducing a first flow of air or gas in a second pipe chamber, the second pipe chamber being defined between the inner pipe and the intermediate pipe; and

wherein the inner pipe includes a second inlet for introducing a flow of a pulverized fuel-air mixture through the inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of the main body, the flow distribution means having a curvature to uniformly change the flow trajectory of the pulverized fuel-air mixture and the flow of air or gas, the distribution means including:

an outer cylindrical body;
an intermediate cylindrical body;
an inner cylindrical body; and
a main chamber;

wherein the outer cylindrical body and the intermediate cylindrical body define a first connecting chamber for circulating the cooling fluid of the main body for the cooling of the flow distribution means;

wherein the inner cylindrical body and the intermediate cylindrical body define a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of the second pipe chamber of the main body; and

wherein the main fluid chamber receives and conveys the mixture of pulverized fuel-air out to at least an exit end of the flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each one of the exit ends of the flow distribution means, the discharge nozzle including:

a central orifice in coincidence with the main fluid chamber for permitting the exit of the pulverized fuel-air mixture; and

a first plurality of orifices disposed in coincidence with the second connecting chamber to permit the first flow of air or gas and the pulverized fuel-air mixture to be simultaneously mixed at the exit end of the flow distribution means for producing a flame in the combustion zone of the glass melting furnace;

wherein the main body includes a conical section, the conical section being uniformly reduced from a major diameter to a minor diameter in the body of the burner, the minor diameter being connected with the flow distribution means for increasing the velocity of the first flow of air or gas and the pulverized fuel-air mixture.

23. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

an outer pipe;

an intermediate pipe; and

an inner pipe;

wherein the pipes are concentrically arranged one with the other;

wherein the outer pipe and the intermediate pipe form a first pipe chamber;

wherein the outer pipe includes:

an inlet pipe; and

an outlet pipe for introducing and for circulating a cooling fluid within the first pipe chamber for the cooling of the burner;

wherein the intermediate pipe includes:

a first inlet for introducing a first flow of air or gas in a second pipe chamber, the second pipe chamber being defined between the inner pipe and the intermediate pipe; and

wherein the inner pipe includes a second inlet for introducing a flow of a pulverized fuel-air mixture through the inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of the main body, the flow distribution means having a curvature to uniformly change the flow trajectory of the pulverized fuel-air mixture and the flow of air or gas, the distribution means including:

- an outer cylindrical body;
- an intermediate cylindrical body;
- an inner cylindrical body; and
- a main chamber;

wherein the outer cylindrical body and the intermediate cylindrical body define a first connecting chamber for circulating the cooling fluid of the main body for the cooling of the flow distribution means;

wherein the inner cylindrical body and the intermediate cylindrical body define a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of the second pipe chamber of the main body; and

wherein the main fluid chamber receives and conveys the mixture of pulverized fuel-air out to at least an exit end of the flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each one of the exit ends of the flow distribution means, the discharge nozzle including:

a central orifice in coincidence with the main fluid chamber for permitting the exit of the pulverized fuel-air mixture; and

a first plurality of orifices disposed in coincidence with the second connecting chamber to permit the first flow of air or gas and the pulverized fuel-air mixture to be simultaneously mixed at the exit end of the flow distribution means for producing a flame in the combustion zone of the glass melting furnace;

wherein the main body includes an enlarged conical section, the enlarged conical section being uniformly reduced from a major diameter to a minor diameter in the body of the burner, the minor diameter being connected with the flow distribution means for increasing the velocity of the first flow of air or gas and the pulverized fuel-air mixture.

24. (new) A burner for burning a pulverized fuel for use in a glass melting furnace, which comprises:

a main body including:

an outer pipe;

an intermediate pipe; and

an inner pipe;

wherein the pipes are concentrically arranged one with the other;

wherein the outer pipe and the intermediate pipe form a first pipe chamber;

wherein the outer pipe includes:

an inlet pipe; and

an outlet pipe for introducing and for circulating a cooling fluid within the first pipe chamber for the cooling of the burner;

wherein the intermediate pipe includes:

a first inlet for introducing a first flow of air or gas in a second pipe chamber, the second pipe chamber being defined between the inner pipe and the intermediate pipe; and

wherein the inner pipe includes a second inlet for introducing a flow of a pulverized fuel-air mixture through the inner pipe;

flow distribution means having their entrance end connected in alignment with a lower end of the main body, the flow distribution means having a curvature to uniformly change the flow trajectory of the pulverized fuel-air mixture and the flow of air or gas, the distribution means including:

an outer cylindrical body;

an intermediate cylindrical body;

an inner cylindrical body; and

a main chamber;

wherein the outer cylindrical body and the intermediate cylindrical body define a first connecting chamber for circulating the cooling fluid of the main body for the cooling of the flow distribution means;

wherein the inner cylindrical body and the intermediate cylindrical body define a second connecting chamber for receiving and for changing the flow trajectory of the first flow of air or gas of the second pipe chamber of the main body; and

wherein the main fluid chamber receives and conveys the mixture of pulverized fuel-air out to at least an exit end of the flow distribution means to be mixed with the first flow of air or gas in a combustion zone of the glass melting furnace; and

a discharge nozzle connected by each one of the exit ends of the flow distribution means, the discharge nozzle including:

a central orifice in coincidence with the main fluid chamber for permitting the exit of the pulverized fuel-air mixture; and

a first plurality of orifices disposed in coincidence with the second connecting chamber to permit the first flow of air or gas and the pulverized fuel-air mixture to be simultaneously mixed at the exit end of the flow distribution means for producing a flame in the combustion zone of the glass melting furnace, wherein the first plurality of orifices disposed in coincidence with the second connecting chamber are formed in an angular position to provide a swirl effect to the first flow of air or gas and to the pulverized fuel-air mixture.